



### CERTIFICATION OF TRANSLATION

I, the undersigned, hereby declare that:

I am knowledgeable in both English and Japanese languages, and

I believe that the Japanese translation attached hereto is a true and accurate translation of Non-Application No. 10/070,331 filed February 26, 2002.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

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[Item] Specification 1

[Item] Drawing 1

[Item] Abstract 1

[TITLE OF DOCUMENT] SPECIFICATION

[TITLE OF THE INVENTION] Location Information Service Supporting  
Method and Location Information Service Supporting Gateway

[CLAIMS]

[Claim 1] A location information service supporting method  
comprising:

a location information obtaining service in which a location  
information service supporting gateway connected with a network  
obtains a location information indicating the location of a locating  
target person for a service provider that provides a service relating  
to the location of the locating target person by using the network;  
and

a location information sending service in which the location  
information service supporting gateway sends the location information  
to a destination designated by the service provider.

[Claim 2] A location information service supporting method of  
Claim 1:

wherein the location information service obtaining service is  
a service for obtaining a location information measured in a locating  
manner appropriate for a mobile device accompanied by the locating  
target person.

[Claim 3] A location information service supporting method of  
Claim 1:

wherein the location information sending service is a service  
in which the format of the location information is changed into a format  
usable for a service that uses the location information and is sent  
to a service provider that provides the service.

[Claim 4] A location information service supporting method of  
Claim 1:

wherein the location information service supporting gateway accumulates the number of task processes incurred due to the provision of the service, and collects service value according to the number of processes from at least one of service providers that provide the service, the locating target person, and a service target person.

[Claim 5] A location information service supporting method of Claim 1:

wherein at least one of the service supporting gateway and a telecommunication carrier that gives radio communication service to the mobile device collects service charge for the service provided by the service provider on behalf of the service provider.

[Claim 6] A location information service supporting method of Claim 1:

wherein the location information service supporting gateway accumulates the number of task processes for each service arising from the provision of the service, provides advertisements to a mobile device of the locating target person, and allots advertisement fee collected from the advertiser to all or a part of service charge corresponding to the number of task processes.

[Claim 7] A location information service supporting method of Claim 1:

wherein the location information service supporting gateway provides an advertisement to a mobile device accompanied with the locating target person, and allots a fee of the advertisement to be received from the advertiser of this advertisement to all or a part of service charge for service from the service provider.

[Claim 8] A location information service supporting method of Claim 2:

wherein the location information obtaining service comprises;

a step of judging a suitable locating method for a mobile device accompanied with the locating target person;

a step of requesting a locating means that locates in the locating method judged as suitable by the result of judgement for locating the current location of the locating target person; and

a step of obtaining the location information sent from the locating means in response to this.

[Claim 9] A location information service supporting method of Claim 8:

wherein the location information service supporting gateway accumulates the number of processes for works arising from the locating, and collects a service charge for the number of processes from at least one of managers of the locating means, the locating target person, and target persons of the service.

[Claim 10] A location information service supporting method of Claim 8:

wherein at least one of the location information service supporting gateway and a communication carrier that provides a wireless communication service to the mobile device collects a fee for location by the locating means on behalf of a manager of the locating means.

[Claim 11] A location information service supporting method of Claim 8:

wherein the location information service supporting gateway accumulates the number of processes of work arising from the service for each service, provides an advertisement to a mobile device accompanied with the locating target person, and allots advertisement fee collected from the advertiser to all or a part of service charge corresponding to the number of task processes.

[Claim 12] A location information service supporting method of

Claim 8:

wherein the location information service supporting gateway provides an advertisement to a mobile device accompanied with the locating target person, and allots a fee of the advertisement to be received from the advertiser of the advertisement to all or a part of locating service charge which a manager of the locating means is to receive.

[Claim 13] A location information service supporting gateway comprising:

a location information obtaining means for obtaining location information indicating the location of locating target person from a predetermined locating means and for managing it;

a location information sending means for obtaining location information of the locating target person from the location information obtaining means and for sending the location information to the locating target person or to a service provider that provides a service relating to the location of the locating target person by using a network; and

an accumulating means for accumulating the number of either obtaining and managing processes of location information by the location information obtaining means or sending processes of location information by the location information sending means to collect service fee based on the number of processes.

[Claim 14] A location information service supporting gateway of Claim 13, further comprising:

a collecting means for collecting service fee in proportion to the accumulated number of processes from at least one of the service provider, the locating target person, managers of the locating means, or target persons of the service.

[Claim 15] A location information service supporting gateway of Claim 13:

wherein the location information obtaining means obtains location information measured in a locating method suitable for mobile device of the locating target person.

[Claim 16] A location information service supporting gateway of Claim 13:

wherein the location information sending means changes the location information into a format suitable for a service using the location information and sends it to a service provider that provides the service.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Technical Field of the Invention]

The present invention relates to a location information service relating to the location of a locating target person and provided by using a network, and particularly to a location information service supporting method and location information service supporting gateway useful for realizing various location information service.

[0002]

[Prior Art]

With the spread of various kinds of mobile devices such as a mobile phone, various services using mobile devices are available. One such service is a location information service providing a service relating to the current location of a locating target person who may be or may not be a user of this service. This location information service is a current location searching service of a PHS phone, a current location searching service of locating a locating target person



such as a senior person or a child, and a service of distributing a content relating to the current location.

[0003]

[Problems to be Solved by Invention]

To carry out this kind of location information service, it is necessary to locate the current location of the locating target person. This location is usually conducted by giving a locating target person a mobile device such as a mobile terminal, a Personal Handy-phone System (PHS) phone, or a Personal Digital Assistant (GPS) with GPS function and by exchange signals for locating between a location device and the mobile device.

[0004]

However, the location methods differ depending on the mobile devices held by a locating target person. Hence, location information service providers at present are able to provide a location information service to only a locating target person having a particular mobile device. Therefore, to provide location information service to many locating target person having various kind of mobile device, the service provider have to prepare location means for various mobile devices; this increases cost for providing location information service. Also, there are cases where necessary representing format of location information is different depending on the content of the location information service. For example, location information expressed by latitude and longitude is preferable when providing one kind of service, and location information expressed by address (character string) is preferable when providing another kind of service. In this case, the service provider has to have means for generating location information with suitable representing format for each service.

As described above, provision of location information services place a great burden on service provider.

[0005]

Although the contents of service provided by various service providers are different, there are only limited kinds of method of obtaining location information necessary to service providers, and it is conceivable that there are many methods that can be shared by service providers. However, service providers install facilities for obtaining and managing location information of user, resulting in investing in the same facilities.

Hence, it is economically more preferable on the whole to release the service providers from these processing such as obtaining and managing location information that can be shared by other service providers, and to let the service providers focus on providing various services by using location information. This can result in promoting free and fair competition among service providers, and consequently various location information services preferable to users can be provided.

[0006]

The present invention is made in accordance with the above idea, and has the object of providing a location information service supporting method, and a location information service supporting gateway that can release service providers from the burden of obtaining and managing location information and can promote a provision of various location information service.

[0007]

[Means for Solving the Problems]

To solve the above problems, in the invention of Claim 1, a location information service supporting gateway connected with a

network provides a service provider that provides a service relating to the location of the locating target person by using the network with a location information obtaining service for obtaining a location information indicating the location of a locating target person and a location information sending service for sending the location information to a specified destination.

[0008]

The invention of Claim 2 is a location information service supporting method of Claim 1: wherein the location information service obtaining service is a service for obtaining a location information measured in a locating manner appropriate for a mobile device accompanied by the locating target person.

[0009]

The invention of Claim 3 is a location information service supporting method of Claim 1: wherein the location information sending service is a service in which the format of the location information is changed into a format usable for a service that uses the location information and is sent to a service provider that provides the service.

[0010]

The invention of Claim 4 is a location information service supporting method of Claim 1: wherein the location information service supporting gateway accumulates the number of task processes incurred due to the provision of the service, and collects service value according to the number of processes from at least one of service providers that provide the service, the locating target person, and a service target person.

[0011]

The invention of Claim 5 is a location information service supporting method of Claim 1: wherein at least one of the service

supporting gateway and a telecommunication carrier that gives radio communication service to the mobile device collects service charge for the service by the service provider on behalf of the service provider.

[0012]

The invention of Claim 6 is a location information service supporting method of Claim 1: wherein the location information service supporting gateway accumulates the number of task processes for each service arising from the provision of the service, provides advertisements to a mobile device of the locating target person, and allots advertisement fee collected from the advertiser to all or a part of service charge corresponding to the number of task processes.

[0013]

The invention of Claim 7 is a location information service supporting method of Claim 1: wherein the location information service supporting gateway provides an advertisement to a mobile device accompanied with the locating target person, and allots a fee of the advertisement to be received from the advertiser of this advertisement to all or a part of service charge for service from the service provider.

[0014]

The invention of Claim 8 is a location information service supporting method of Claim 2: wherein the location information obtaining service comprises; a step of judging a suitable locating method for a mobile device accompanied with the locating target person; a step of requesting a locating means that locates in the locating method judged as suitable by the result of judgement for locating the current location of the locating target person; and a step of obtaining the location information sent from the locating means in response to this.

[0015]

The invention of Claim 9 is a location information service supporting method of Claim 8: wherein the location information service supporting gateway accumulates the number of processes for works arising from the locating, and collects a service charge for the number of processes from at least one of a manager of the locating means, the locating target person, and a target person of the service.

[0016]

The invention of Claim 10 is a location information service supporting method of Claim 8: wherein at least one of the location information service supporting gateway and a communication carrier that provides a wireless communication service to the mobile device collects a fee for location by the locating means on behalf of a manager of the locating means.

[0017]

The invention of Claim 11 is a location information service supporting method of Claim 8: wherein the location information service supporting gateway accumulates the number of processes of work arising from the service for each service, provides an advertisement to a mobile device accompanied with the locating target person, and allots advertisement fee collected from the advertiser to all or a part of service charge corresponding to the number of task processes.

[0018]

The invention of Claim 12 is a location information service supporting method of Claim 8: wherein the location information service supporting gateway provides an advertisement to a mobile device accompanied with the locating target person, and allots a fee of the advertisement to be received from the advertiser of the advertisement to all or a part of locating service charge which a manager of the

locating means is to receive.

[0019]

The invention of Claim 13 is characterized by comprising: a location information obtaining means for obtaining location information indicating the location of locating target person from a predetermined locating means and for managing it; a location information sending means for obtaining location information of the locating target person from the location information obtaining means and for sending the location information to the locating target person or to a service provider that provides a service relating to the location of the locating target person by using a network; and an accumulating means for accumulating the number of either obtaining and managing processes of location information by the location information obtaining means or sending processes of location information by the location information sending means to collect service fee based on the number of processes.

[0020]

The invention of Claim 14 is a location information service supporting gateway of Claim 13 with a collecting means for collecting service fee in proportion to the accumulated number of processes from at least one of the service provider, the locating target person, managers of the locating means, or target persons of the service.

[0021]

The invention of Claim 15 is a location information service supporting gateway of Claim 13: wherein the location information obtaining means obtains location information measured in a locating method suitable for mobile device of the locating target person.

[0022]

The invention of Claim 16 is a location information service

supporting gateway of Claim 13: wherein the location information sending means changes the location information into a format suitable for a service using the location information and sends it to a service provider that provides the service.

[0023]

[Embodiment of the Invention]

With reference to the drawings, embodiments of the present invention will be described. However, following embodiments are only examples of the present invention, and the present invention can have various forms within the scope of the technical idea.

[0024]

A. Location information service supporting model

A-1, Entire configuration

Fig. 1 is a block diagram showing the entire configuration of the location information service supporting model according to this embodiment. As shown in the figure, the location information service supporting model is essentially comprised of a service supporting gateway 1, a network 2 such as a mobile communication network or a fixed network, a service provider 3, and a locating target person 4.

[0025]

Service provider 3 is one of various organizations that provide location information service relating to the current location of locating target person 4 by using network 2. Service provider 3 includes an Application Service Provider (ASP) 31 that has an application software for, for example, a map service system, a car allocation managing system, and a store managing system and uses them for client corporation, and a Content Provider (CP) 32 that conducts an information distribution service relating to the user's current location such as sightseeing information, map information, and

restaurant information.

[0026]

Service supporting gateway 1 is connected to network 2 and to service provider 3 via an unshown network or private line such as Internet. Service supporting gateway 1 relays data communication between networks and has a function of obtaining and managing location information necessary for location information service of service provider 3.

[0027]

Configuration of service supporting gateway 1 will be described in detail below.

As shown in Fig. 1, service supporting gateway 1 has a locate-request distribution server 11, a location information server 12, and an application middleware server 13. Also, a locating unit 1A is connected to service supporting gateway 1.

[0028]

Locating unit 1A is a means for measuring the current location of locating target person 4. For this embodiment, locating target person 4 has to have a mobile device to receive location information service relating to the current location of locating target person 4. Locating unit 1A measures the current location of locating target person 4 in cooperation with the mobile device held by locating target person 4.

In this explanation, locating target person 4 carries a mobile device such as a mobile phone, a Personal Handy-phone System (PHS) phone, or a portable device like a Personal Digital Assistant (PDA) with a function of Global Positioning System (GPS). Depending on the mobile device, a method of measuring the current location of the locating target person (a procedure for obtaining the current location)



differs. Therefore, locating unit 1A has various means for these locating methods.

Note that locating unit 1A may be a separate unit from service supporting gateway 1, or may be a part of service supporting gateway 1.

[0029]

To receive location information service relating to the current location, locating target person 4 sends locate-request to service supporting gateway 1 by using his or her mobile device. Depending on the location information service, this locate-request is sent to service supporting gateway 1 by service provider 3. Locate-request distribution server 11 in service supporting gateway 1 is a means for distributing locate-request sent as this to a locating means of locating unit 1A suitable to the mobile device of locating target person 4.

[0030]

Location information server 12 is a means that manages the location information of locating target person 4 obtained by locating means of locating unit 1A and provides the location information with user or service provider 3 and so on who desires these information. In more detail, location information server 12 stores temporarily the location information sent from locating unit 1A, changes the location information into a representing format suitable to processes conducted by the user or service provider 3, and provides to the user or to service provider 3. For example, location information server 12 has a function of changing a location information expressed by latitude and longitude into a location information expressed by address.

Note that the user here is a person who receives a service provided by service provider (that is, a person aimed at for the

service), can be a locating target person himself, and can be another person depending on the service.

[0031]

Application middleware server 13 is a means for conducting, on behalf of service provider 3, processes such as user authentication or billing processes necessary when service provider 3 provides user with location information service.

[0032]

Service supporting gateway 1 uses these means to conduct service supporting tasks such as obtaining, managing and providing location information of user, verifying user, and charging a user for service provider 3. Service provider 3 accepts the location information service supporting tasks and provides users with various location information services, and gets service charge.

Owner of service supporting gateway 1 receives service charge for location information supporting tasks from service provider 3 or users.

These are overall pictures of location information service supporting models of the embodiments.

[0033]

#### B. Various mode of the location information service

Figs. 2 to 5 show various mode of the location information service provided by service provider 3 with support of service support gateway 1. These services will be described below.

[0034]

##### (1) Self-location searching service (Fig. 2)

First, a service mode called self-location searching service will be described.

This self-location searching service is a service that provides

a user (locating target person 4), for example a pedestrian, with his or her current location, with information about the vicinity of the current location, or route from the current location to his or her destination after searching it.

[0035]

This self-location searching service is provided, for example, as follows.

First, a user wishing the self-location searching service calls and sends locate-request to service supporting gateway 1 via network 2 by using his or her mobile device.

Locate-request distribution server 12 of service supporting gateway 1 receives the locate-request and determines the type of mobile device (for example, mobile device with GPS function, PHS phone, or a mobile packet terminal), and then sends the locate-request to a locating unit 1A among the locating means of locating unit 1A suitable for the determined type of the mobile device. As a result, the locating means and user's mobile device exchange signals for obtaining location information, whereby processes of locating is carried out.

To give an example, if a user's mobile device is, for example, a PHS phone, and a locating means calls a PHS phone via network 2, the paging signals are sent to the PHS phone via the base station of the PHS phone which is in its service area. The PHS phone sends the identification information of the base station included in the paging signals back to the locating means. The locating means changes the identification information of the base station into location information (for example, latitude-longitude information).

Also, if a user's mobile device is, for example, a portable phone with GPS function, and a locating means pages the portable phone via network 2, the portable phone sends the current location information

expressed by latitude and longitude obtained by its GPS function back to the locating means. The locating means uses differential information of latitude-longitude information obtained by Differential Global Positioning System (DGPS), corrects the latitude-longitude information received from the portable phone, and generates location information.

Location information server 12 of service supporting gateway 1 stores the obtained location information and sends the location information to the mobile device of the user or service provider 3 giving location information service. In this case, when there is a need for changing representing format of the location information into the one suitable to processes of service provider 3, location information server 12 does so to send it. As a result, a user can know his or her own location, and service provider 3 can send to the user's mobile device information relating to the location information such as a map data around the current location indicated by the location information.

[0036]

Note that service supporting gateway 1 is also able to obtain location information of a mobile device without paging it. For example, when a portable phone with a GPS function is used and when the portable phone sends to service supporting gateway 1 a locate-request together with the latitude-longitude information obtained by the GPS function, service supporting gateway 1 can obtain latitude-longitude information without paging portable phone. Also, if a mobile device includes a paging signal used when paging service supporting gateway via network 2 an identification information of the base station with which the mobile device communicates, service supporting gateway 1 is able to obtain the location information without paging a portable

phone even if the portable phone is a PHS phone or a portable phone without a GPS function.

[0037]

(2) Self-location registration service (Fig. 3)

Next, a service mode called self-location registration service will be described.

This self-location registration service is a location information service in which location information server 12 of service supporting gateway 1 obtains and stores periodically the location information from, for example, a corporate employee (locating target person 4) and notifies it to a manager (user) of the corporation.

[0038]

This self-location registration service is given, for example, as follows.

First, a portable phone with a GPS function held by a corporate employee or a communication terminal with a GPS function equipped in a car driven by a corporate employee periodically pages service supporting gateway 1 and sends locate-request and registration request of self-location.

Each time service supporting gateway 1 receives the locate-request and registration request of self-location, it obtains the location information of the corporate employee and saves it on location information server 12. These processes are the same as described in the explanation for the self-location searching service; hence the explanation for them is not given.

Each time service supporting gateway 1 receives the locate-request and registration request of self-location, it determines service provider 3 from the terminal identifier (call number) of the mobile device sending these requests, and sends to service provider

3 the location information of the corporate employee. In this process, when there is a necessity of changing representing format of the location information into the one suitable for the process of service provider 3, location information server 12 does so and sends the location information.

Service provider 3 stores the location information of all its employees sent as this into its location registration server. When service provider 3 receives a request from a manager of the corporate, it retrieves the location information from the location information server and sends it to the manager.

[0039]

Note that service supporting gateway 1 may store location information on corporate employees on behalf of service provider 3. In this case, a service given by service provider 3 is, for example, as follows: overlapping a map on the location information stored in service supporting gateway 1 for an easy use to corporate manager, and sending it to corporations.

Also, instead of sending location information by service supporting gateway 1 to service provider 3 (a so-called push type information distribution), service provider 3 may obtain location information from service supporting gateway 1 (a so-called pull type information distribution).

[0040]

### (3) Self-location notification service (Fig. 4)

Next, a service mode called self-location notification service will be described.

This self-location notification service is a location information service such as the current location of a user (locating target person 4) is immediately notified to an emergency center at

the time of an emergency such as incident and a rescuer is called on.

[0041]

This self-location notification service is provided in a manner, for example, as follows.

First, a user who subscribes to the self-location notification service makes a call and sends a locate-request to service supporting gateway 1 via network 2 when, for example, an engine trouble stops his or her car.

Service supporting gateway 1 receives the locate-request, obtains the location information of the user, and stores it in location information server 12. These processes are the same as described in the explanation for the self-location searching service; hence the explanation for them is not given.

Next, service supporting gateway 1 transmits the location information to the mobile device that sent the locate-request. The location information is received by the mobile device and displayed on the display of the mobile device. Also, the mobile device sends the location information and self-location notification request to service supporting gateway 1.

When service supporting gateway 1 receives the location information and self-location notification request, it determines service provider 3, the provider of this self-location notification service, by using a terminal identifier (call ID) of the mobile device that sent them. Then service supporting gateway 1 sends the location information of the user. When sending location information, service supporting gateway 1 changes the representing format of location information if it is necessary to do so for conforming the representing format to the process of service provider 3.

Service provider 3 sends thus-sent location information of the

user to a service provider's center that gives a service such as car allocation. The staff of the service provider's center determines the current location of the user who has trouble because his or her car fails to move, and the staff goes to the location to solve the trouble.

[0042]

Note that a mobile device may or may not display the location information sent from service supporting gateway 1. Also, the mobile device may send the location information to service supporting gateway 1 without displaying.

Also, in the above explanation, service supporting gateway 1 sends location information to service provider 3 after sending it to the mobile device. This is in order to get permission from the user about sending his or her location information to the service provider. However, if there is already an agreement that it is not necessary to gain user's permission to send his or her location information, service supporting gateway 1 may send the location information to service provider 3 without sending it to the mobile device.

[0043]

#### (4) Other person's location searching service (Fig. 5)

Next, a service mode called other person's location searching service will be described.

The other person's location searching service is a service that provides a parent, a user, with the current location of locating target person such as his or her child, pet, or old person.

[0044]

This other person's location searching service is provided, for example, as follows.

First, when a user, a parent, who subscribes the other person's location information search service wants to know the current location



of his or her child (a locating target person), the user calls service provider 3 through some kind of communication means and sends a search request.

For all users of the other person's location searching service, service provider 3 stores identifiers of mobile devices of their locating target persons. When service provider 3 receives the search request, it retrieves the identifier of the mobile device of the locating target person of the user who sent the search request and sends the identifier and the search request to service supporting gateway 1.

When service supporting gateway 1 receives the locate-request and the identifier of the mobile device, service supporting gateway 1 pages the mobile device of the locating target person by using the identifier of the mobile device to obtain the location information and store it in location information server 12. These processes are the same as described in the explanation for the self-location searching service; hence the explanation for them is not given. However, since the mobile device is not communicating with service supporting gateway 1 at this time, it is impossible to use the above-mentioned method in which location of the locating target person is carried out without paging the mobile device.

Next, service supporting gateway 1 sends the location information about the locating target person to service provider 3 that sent the locate-request. In this case, if it is necessary to change the representing format of the location information into the one suitable for processes at service provider 3, location information server 12 does so before sending the location information.

Service provider 3 sends thus-sent location information of the locating target person to the user as a search result.

[0045]

### C. Function of Service Supporting gateway

Next, service supporting tasks for each of the location information services executed by service supporting gateway 1 will be described in detail.

Figs. 6 to 9 show details of service supporting tasks executed by service supporting gateway 1.

[0046]

(1) Service supporting tasks for self-location searching service (Fig. 6)

Fig. 6 shows service supporting tasks executed by service supporting gateway 1 when a service provider 3 provides its user (or locating target person) with a certain service (named here as service W) belonging to the domain of location information searching service. This service supporting tasks includes the following processes.

[0047]

#### (A) User authentication

When a locate-request is sent to service supporting gateway 1 from a user wishing service W, application middleware server 13 of service supporting gateway 1 carries out a user authentication if the user who sent this locate-request is a subscriber of service W.

Application middleware server 13 stores subscriber data of users, namely subscribers of the service, for each service which a plurality of client service providers 3 provide. The subscriber data has a certification information to verify the user validity, information about acts allowed to the user. By these data, application middleware server 13 carries out user authentication.

#### (B) Approval

When user validity is verified by user authentication, the user

can send a desired request to service supporting gateway 1. Application middleware server 13 sees subscriber data for service W and judges if the request from the user is an act allowed to the user. This judgement is named here as approval.

(C) Measurement of self-location

In a case where a locate-request for searching the self-location is allowed to a user of service W, when service supporting gateway 1 receives locate-request from the user, it locates the current location of the user with a suitable method for the mobile device of the user.

(D) Management of the amount of access

When service supporting gateway 1 searches self-location for providing service W and then registers it on location information server 12, service supporting gateway 1 measures the amount of access (for example, the number of self-location searching times) and saves it into an unshown database for billing. This management of the amount of access is carried out for each service given by service supporting gateway 1.

(E) Change of location representing format

Service supporting gateway 1 changes the location information of the user into a representing format appropriate to service W.

(F) Notification

Service supporting gateway 1 sends the location information of the user to locating target person or service provider 3 that is a provider of service W.

(G) Encryption

When sending the location information, service supporting gateway 1 conducts an encryption to ensure security by using Secure Socket Layer (SSL).

This encryption is not necessary when the system has security. For example, when service supporting gateway 1 and a service provider are connected by a private line, encryption is not necessary. The same thing can be said in following other services. When security is secured in the services, encryption is not necessary.

[0048]

(2) Service supporting tasks for self-location registration service (Fig. 7)

Fig. 7 shows service supporting tasks executed by service supporting gateway 1 when service provider 3 provides a certain corporation with a service (referred to service X here) belonging to a self-location registration service. The service supporting tasks are comprised of a service supporting task of self-location registration demanded by a corporate employee (a locating target person) and a service supporting task of referring to the location information demanded by a corporate manager (user).

[0049]

<Service supporting task for self-location registration>

(A) User authentication

When service supporting gateway 1 receives a locate-request from a corporate manager that is a subscriber of service X, application middleware server 13 of service supporting gateway 1 carries out user verification if the locating target person sending the locate-request is a manager of corporation which is a subscriber of service X.

Application middleware server 13 stores subscriber data for each employee of a corporation which is a subscriber of service X. This subscriber data includes a certification information for verifying validity of the corporate employee, information about acts allowed to the employee. Application middleware server 13 carries out user

authentication by using the subscriber data.

(B) Approval

When service supporting gateway 1 receives a request from a locating target person, service supporting gateway 1 judges if the request is for an act allowed to the locating target person.

(C) Measurement of self-location

When service supporting gateway 1 receives locate-request, it locates a locating target person by using locating unit 1A.

(D) Registration

Service supporting gateway 1 registers the location information obtained in the self-locating with location information server 12.

(E) Billing management

When service supporting gateway 1 is accessed for searching self-location in service X, it stores the amount of accesses in a database.

[0050]

<Service supporting task for location searching>

(A') User authentication

Service provider 3 that provides service X transmits to service supporting gateway 1 a request for referring to location information of an employee of a certain corporation that is a subscriber of service X. This transmission of request for referring may be carried out periodically or when a manager of a corporation which is a subscriber of service X requests to a provider of service X. What is a trigger of sending to service supporting gateway 1 a request for referring to location information depends on the agreement about service X concluded between a corporation and service supporting gateway 1.

When this request for referring to location information is sent to service supporting gateway 1, application middleware server 13

verifies if the sender is a proper provider of service X.

(B') Approval

When service supporting gateway 1 receives a request from the provider of service X whose validity has been verified, service supporting gateway 1 judges whether the request is for an approved act.

(C') Reference

In this explanation, service provider 3 that is a provider of service X has access to location information server 12 to see location information of corporate employee. Therefore, this request for referring to location information is allowed. By this, service provider 3 sends terminal identifiers of each mobile device of each corporate employee as keys. Service supporting gateway 1 reads out location information for the keys from location information server 12.

(D') Management of the amount of access

When service supporting gateway 1 reads out the location information to provide service X as above, service supporting gateway 1 measures the amount of access occurred during the readout and saves it into a database for billing.

(E') Change of location representing format

Service supporting gateway 1 changes the representing format of the location information read out from location information server 12 if necessary. This change includes a change from latitude and longitude to address (character string). What kind of change is carried out depends on an agreement concluded in advance between the provider of service X and service supporting gateway 1.

(F') Encryption

Service supporting gateway 1 encrypts the location information

and sends it to service provider 3 that is a provider of service X.

[0051]

(3) Service supporting task for self-location notification service (Fig. 8)

Fig. 8 shows service supporting tasks executed by service supporting gateway 1 when a service provider 3 provides its user (namely a locating target person) with a certain service (referred to service Y here) belonging to self-location notification service. This service supporting task is comprised of the following processes.

[0052]

(A) User authentication

When a locate-request is sent from a user wishing service Y to service supporting gateway 1, application middleware server 13 of service supporting gateway 1 verifies whether the user who sent the locate-request is a subscriber of service W.

(B) Approval

When validity of the user is verified, the user can send a desired request to service supporting gateway 1. Application middleware server 13 of service supporting gateway 1 sees the subscriber list for service W and judges whether the request from the user is an act allowed to the user.

(C) Measurement of self-location

When it is supposed that a locate-request is allowed to a user of service Y. When service supporting gateway 1 receives the locate-request from a user, it locates the user by using locating format suitable to the mobile device of the user.

(D) Management of the amount of access

When searching the self-location is carried out for providing service Y, the amount of accesses (for example, the number of

self-location searching) is measured and stored in a database for billing. This management of the number of accesses is carried out for each service given by service supporting gateway 1.

(E) Change of location representing format

Service supporting gateway 1 changes the location information of the user into a representing format appropriate to service Y. For example, changing from latitude and longitude into address (character string) is carried out.

(F) Notification

Service supporting gateway 1 sends the location information of the user to service provider 3 that is a provider of service Y.

(G) Encryption

Service supporting gateway 1 encrypts the location information and sends it to ensure security.

[0053]

(4) Service supporting task for other person's location searching service (Fig. 9)

Fig. 9 shows a service supporting tasks executed by service supporting gateway 1 when a service provider 3 provides its users with a certain service (referred to service Z here) belonging to an other person's location searching service. This service supporting tasks is comprised of following processes.

[0054]

(A) User authentication

A user of the service Z sends to service provider 3 which is a provider of service Z a searching request of the current location of the user's locating target person. Service provider 3 that received the request sends to service supporting gateway a searching request for the current location of the locating target person. Application



middleware server 13 of service supporting gateway 1 carries out user authentication to verify the validity of service provider 3 that sent the locating request.

(B) Approval

When validity of service provider 3 is verified by the user authentication, service provider 3 is able to send a desired request to service supporting gateway 1. Application middleware server 13 judges if the request from service provider 3 is an allowable act.

(C) Measurement of other person's location

In this explanation, service provider 3 providing service Z is allowed to search the current location of locating target person of user of service Z. Therefore, about a request for the current location from this service provider 3, approval for approving this is made. As a result, service supporting gateway 1 demands a terminal identifier of the mobile device of the locating target person, pages the mobile device and sends a request for locating. As a result, locating unit 1A of service supporting gateway 1 and the mobile device exchange signals for locating the current location of the locating target person. Then information indicating the current location of the locating target person is sent to service supporting gateway 1.

(D) User authentication

Service supporting gateway 1 verifies the validity of the locating target person who sent information indicating the current location.

(E) Approval of user

Service supporting gateway 1 judges if the act of locating the current location and registration is allowed to the locating target person.

(F) Measurement of self-location

When the result of the judgement is positive, service supporting gateway 1 conducts correction of information of the current location when necessary (for example, a correction of latitude and longitude when location is carried out using DGPS), and generates location information of the locating target person.

(G) Registration

Service supporting gateway 1 registers the location information such as expressed by latitude and longitude obtained as above together with the locating time, the locating method, and other additional information with location information server 12.

(H) Reference

Service supporting gateway 1 reads out from location information server 12 the location information of the locating target person who is searched for by service provider 3.

Note that these (G) and (H) processes are not necessarily carried out. Service supporting gateway 1 is able to send to service provider 3 the obtained location information together with the locating time, the locating method, and other additional information.

(I) Management of the amount of access

When service supporting gateway 1 retrieves other person's location to provide service Z, service supporting gateway 1 measures the amount of access (for example, the number of searching times of other person's location) and saves it into a database for billing.

(J) Change of location representing format

Service supporting gateway 1 changes the location information of the user into a representing format appropriate to service X. For example, changing from latitude and longitude into address (character string) is carried out.

(K) Encryption

Service supporting gateway 1 encrypts the location information of the locating target person and sends it to service provider 3 that is a provider of service Z.

[0055]

#### D. Service Charge Collection System

Next, service charge collecting methods used in the location information service supporting model will be described. There are three service charge collecting methods as follows.

##### (1) First Method

Fig. 10 is a diagram showing the first method for collecting service charge used in the location information service supporting model of the embodiment.

In this first method, a user who receives location information service pays the charge for a telephone call to the telecommunication carrier, and pays service charge to service provider 3 that provides location information service.

Since service provider 3 uses service supporting gateway 1 when providing location information service, service provider 3 pays the value for it, namely the license fee to use the gateway to the owner of service supporting gateway 1. The amount of license fee required to use the gateway is calculated based on the amount of access saved by service supporting gateway 1 into a database for billing.

Note that a service charge collecting process by service supporting gateway 1 is not necessarily conducted by service supporting gateway 1. It is needless to say that, for example, a service charge collecting system set up separated from service supporting gateway 1 may conduct the process by request from service supporting gateway 1. The same thing can be said in the following second and third methods and modifications.

[0056]

## (2) Second Method

Fig. 11 is a diagram showing the second method for collecting service charge used in the location information service supporting model of the embodiment.

In this second method, an assumption is made that service provider 3 connected to service supporting gateway 1 directly by a private line distributes to a user receiving a self-location searching service a non-free information relating to the location of the user via the private line and service supporting gateway 1.

In this case, the communication carrier collects the charge for a telephone call from its users, monthly service charge for service supporting gateway 1 and information service charge for paid information.

Communication carrier pays the monthly service charge collected from its user to service supporting gateway 1, and information service charge to service provider 3.

Since service provider 3 uses service supporting gateway 1 to obtain location information of users when distributing information relating to location information, service provider 3 pays to owner of service supporting gateway 1 a license fee to use the gateway.

Note that service supporting gateway 1 may collect information service charge together with collecting monthly service charge of service supporting gateway 1 directly from users. Then service supporting gateway 1 extracts a license fee to use service supporting gateway 1 by service provider 3 from the collected information charge, then pays the remained value to service provider 3.

[0057]

## (3) Third method

Fig. 12 is a diagram showing the third method of service charge collection used in the location information service supporting model of the embodiment.

In this third method, advertisements provided by unshown advertisers are displayed on the mobile device of the locating target person. Advertising fees collected from the advertisers are allotted to a part or all of the service charge of the location information service and license fee for the use of the gateway.

In more detail, while service supporting gateway 1 is providing location information service to its user, it sends data of various advertisement to a mobile device so that the mobile device displays the advertisement. Service supporting gateway 1 measures time of displaying the advertisement and sends to the advertiser a bill based on the measured time. The advertiser pays the fee of advertisement to the owner of service supporting gateway 1.

Then the owner of service supporting gateway 1 extracts the license fee to use the gateway from the fee of advertisement, then pays the remained value to service provider 3 as service charge. This license fee to use the gateway is calculated based on the number of access recorded by service supporting gateway 1 on a database for billing.

[0058]

#### E. Modification

As described above, the present invention is not limited to the above embodiments, and various other forms can be included in its scope.

In the above embodiment, locating unit 1A locates mobile devices for various service supporting tasks carried out by service supporting gateway 1. That is, in the above embodiment, locating unit 1A has a kind of supporting role to service supporting gateway 1.

However, not limited to this, locating process itself by locating unit 1A can be considered to be one service task. In this case, locating unit 1A may be installed in service supporting gateway 1 as in above embodiment, connected to service supporting gateway 1 by a private line, or connected to service supporting gateway 1 by the Internet: there can be many connection method. But locating unit 1A carries out location in isolation from service supporting gateway 1, and collects service charge for this locating: these are different points from the above embodiment.

As a service charge collecting method, methods in Figs. 11 to 13 with changes of service provider 3 to locating unit 1A can be applied. Here, manager of locating unit 1 means that a project implementing body who provides location service by managing and operating locating unit 1A and collects service charge for it.

[0059]

[Effects of the invention]

As described, according to the present invention, it is possible to release service providers from a burden of obtaining and managing location information and to let the service provider to provide various location information services.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Fig. 1] A block diagram showing the entire configuration of the location information service supporting model of an embodiment of the present invention.

[Fig. 2] A diagram showing one form of self-location searching service provided by the embodiment.

[Fig. 3] A diagram showing one form of self-location registration service provided by the embodiment.

[Fig. 4] A diagram showing one form of self-location

notification service provided by the embodiment.

[Fig. 5] A diagram showing one form of other person's location searching service provided by the embodiment.

[Fig. 6] A diagram showing details of service supporting tasks of the self-location searching service provided by the embodiment.

[Fig. 7] A diagram showing details of service supporting tasks of the self-location registration service provided by the embodiment.

[Fig. 8] A diagram showing details of service supporting tasks of the self-location notification service provided by the embodiment.

[Fig. 9] A diagram showing details of service supporting tasks of the other person's location searching service provided by the embodiment.

[Fig. 10] A diagram showing the first method of collecting service charge used at the location information service supporting model of the embodiment.

[Fig. 11] A diagram showing the second method of collecting service charge used at the location information service supporting model of the embodiment.

[Fig. 12] A diagram showing the third method of collecting service charge used at the location information service supporting model of the embodiment.

[Description of References]

1... Service supporting gateway

2... Network

3... Service provider

4... Locating target person

31... ASP

32... CP

1A... Locating unit (Locating means)

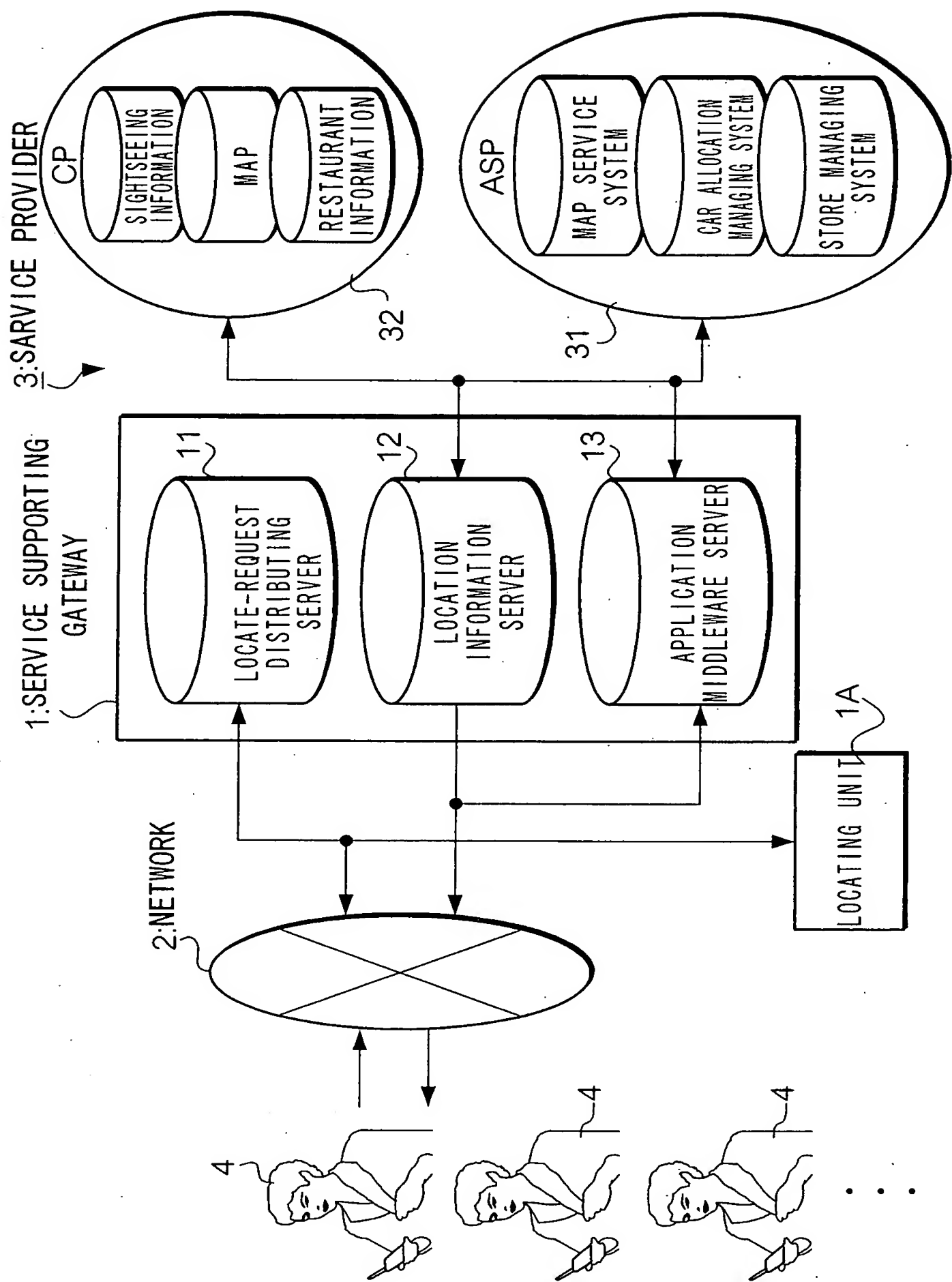
11... Locate-request distribution server (Location information obtaining means)

12... Location information server (Location information obtaining means, Location information transmitting means)

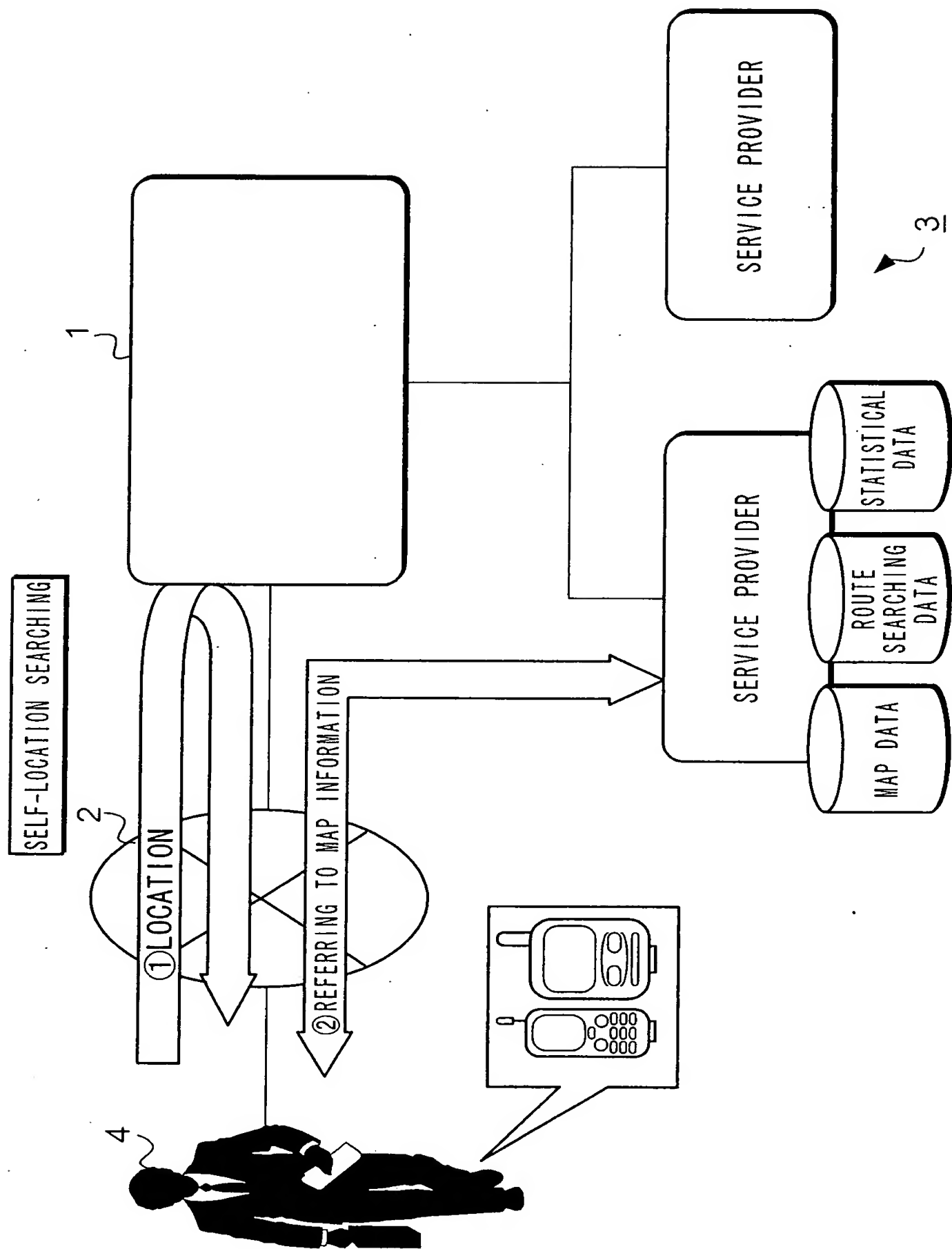
13... Application middleware server (accumulating means, collecting means)



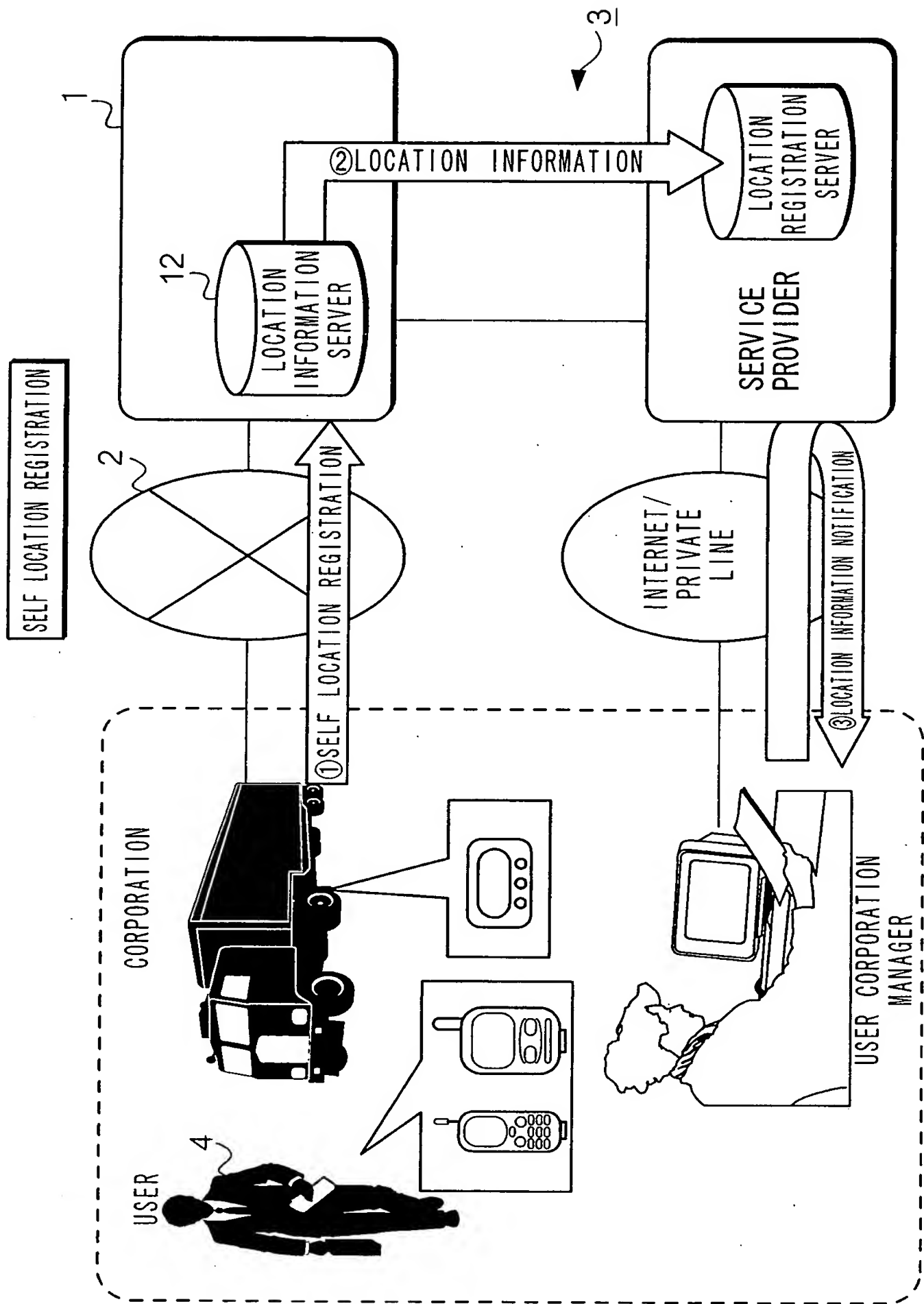
【FIG. 1】



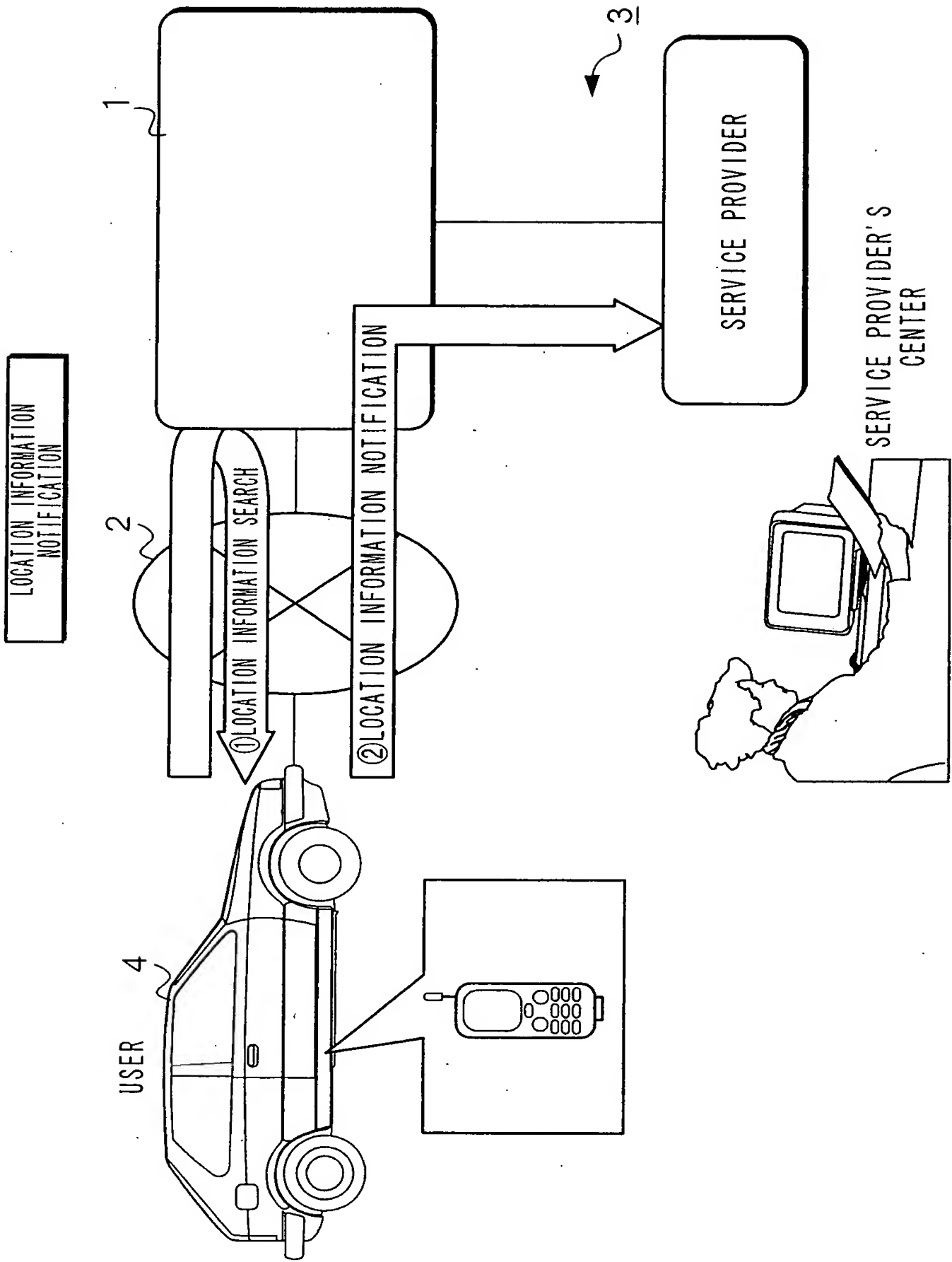
【FIG. 2】



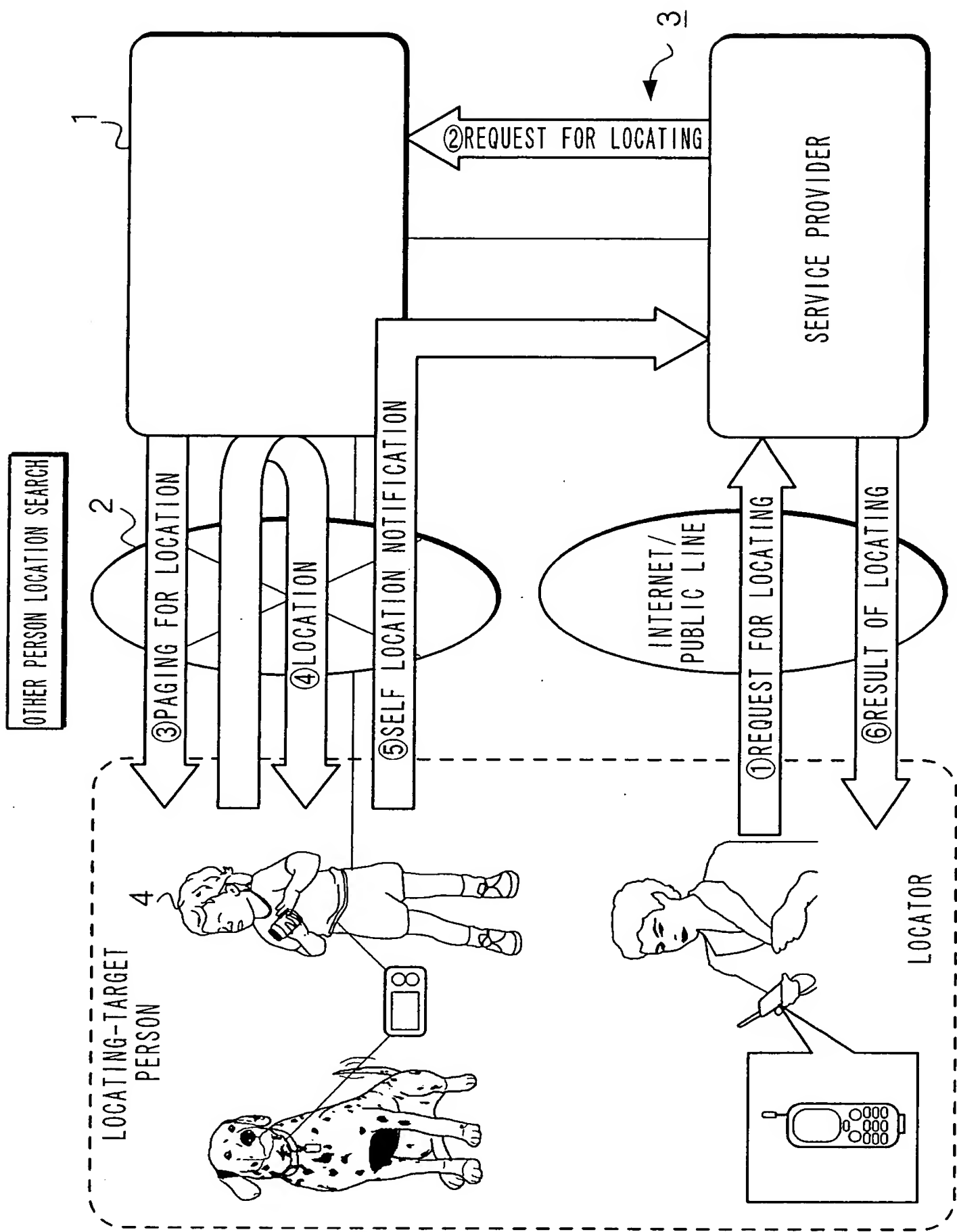
[FIG. 3]



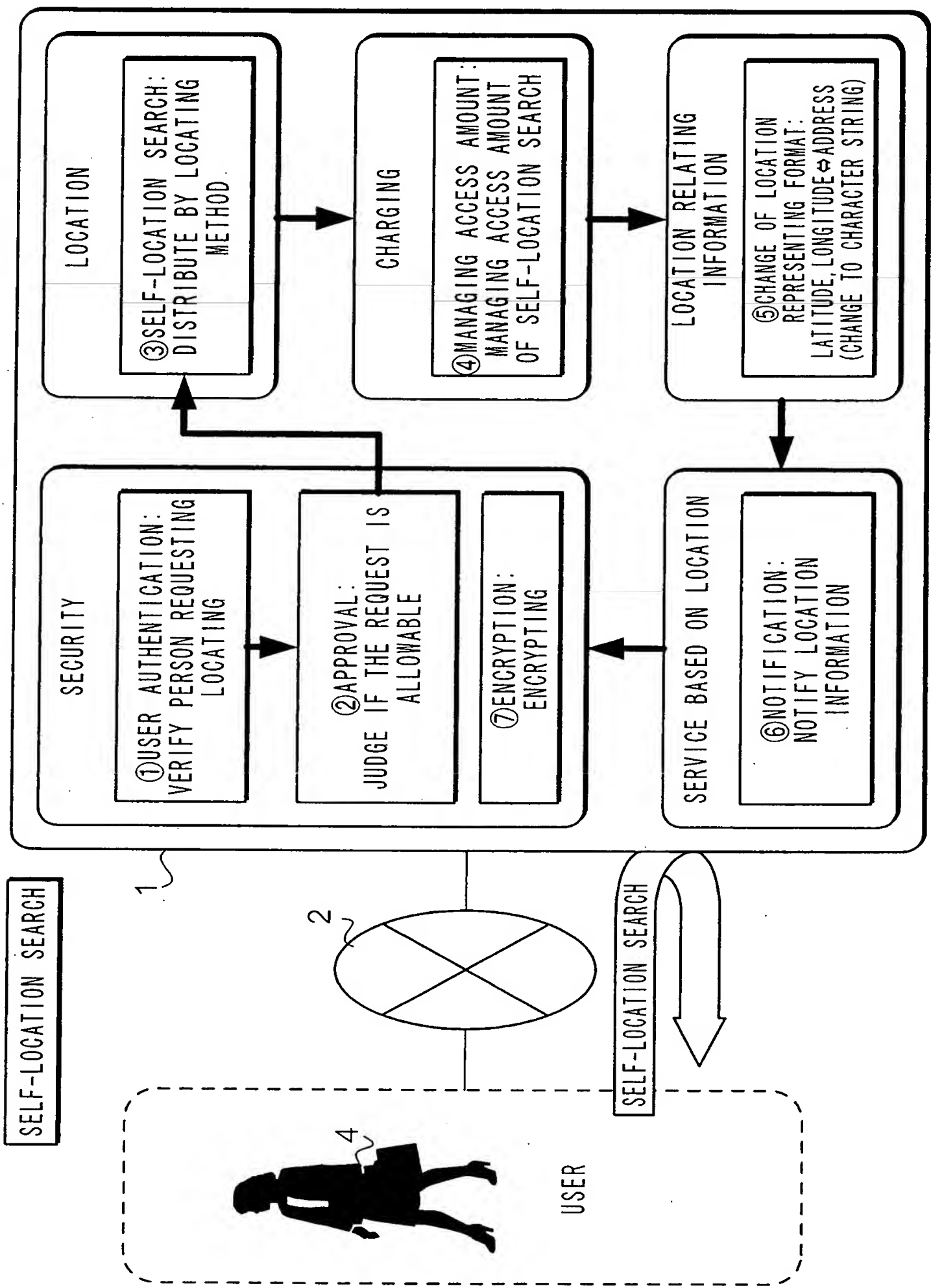
[FIG. 4]



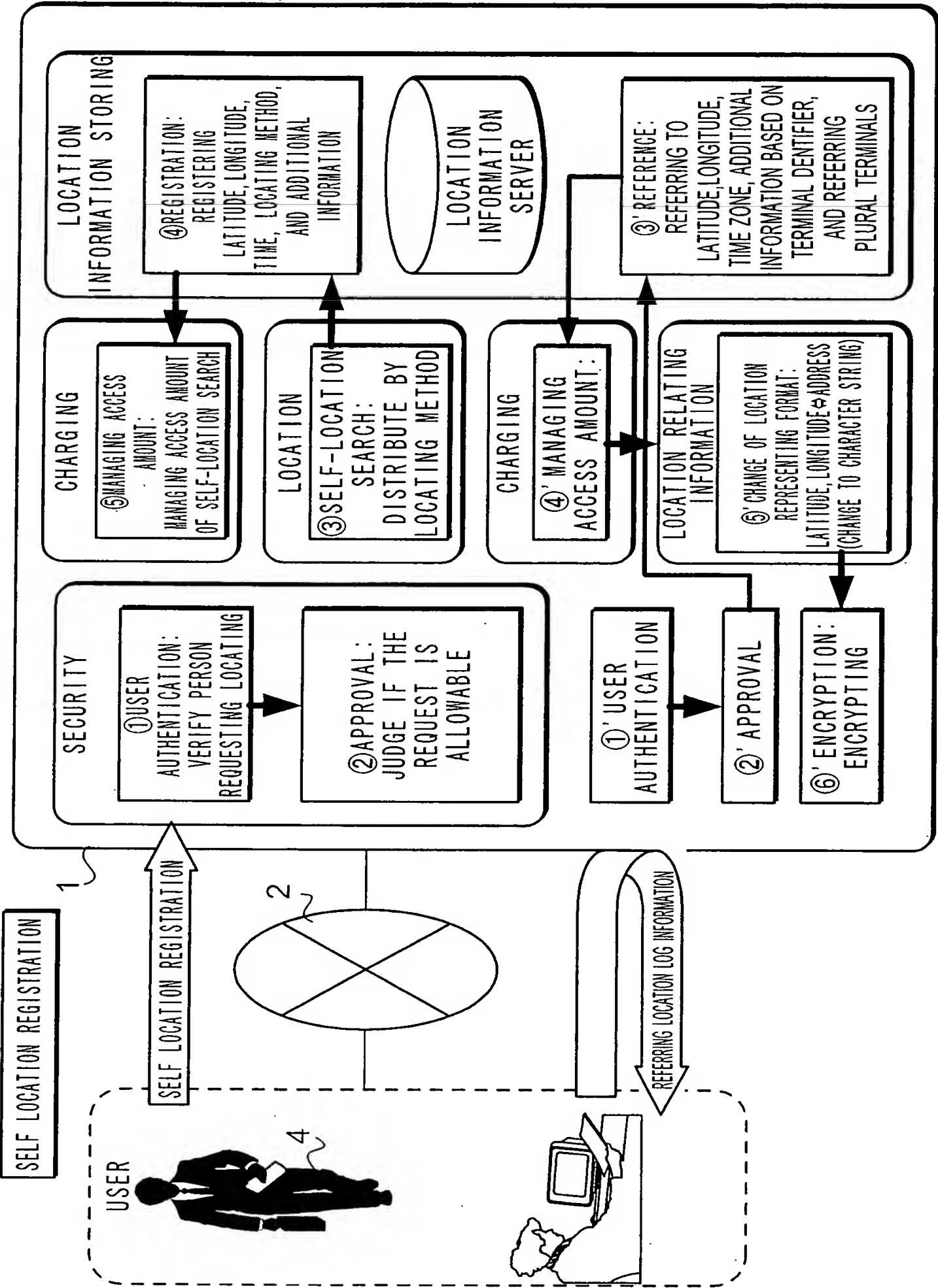
【FIG. 5】



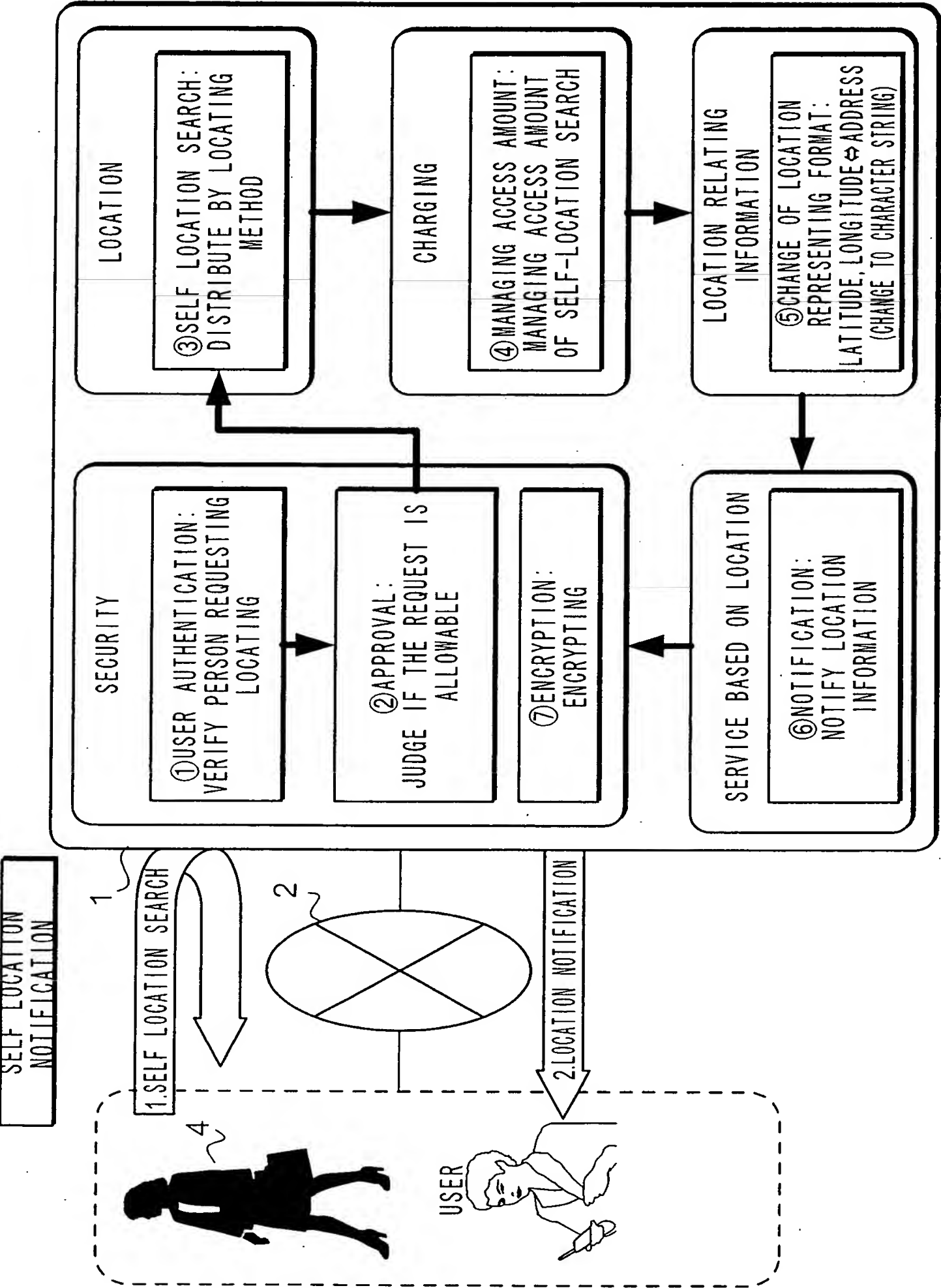
【FIG. 6】



[FIG. 7]

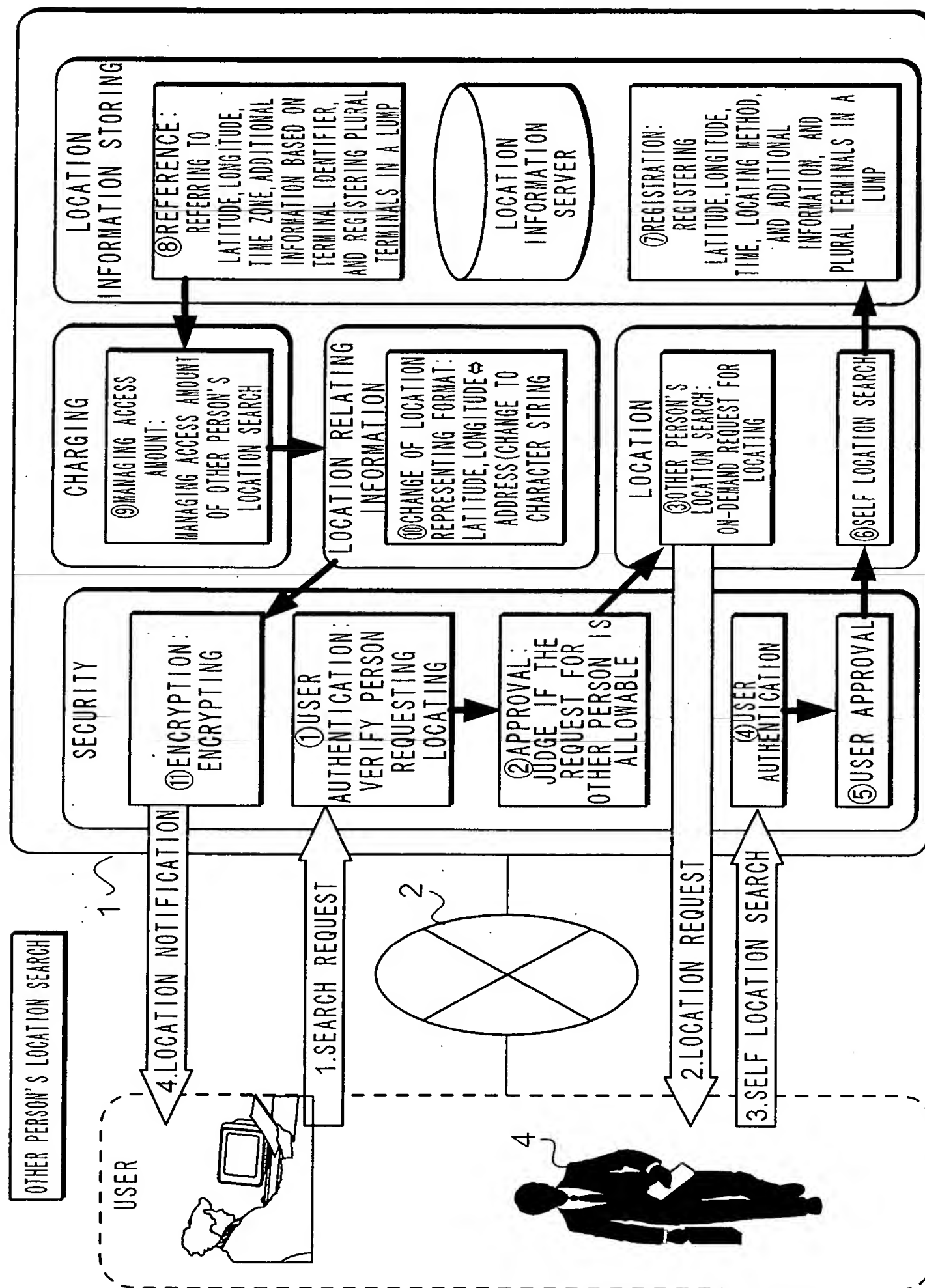


[FIG. 8]

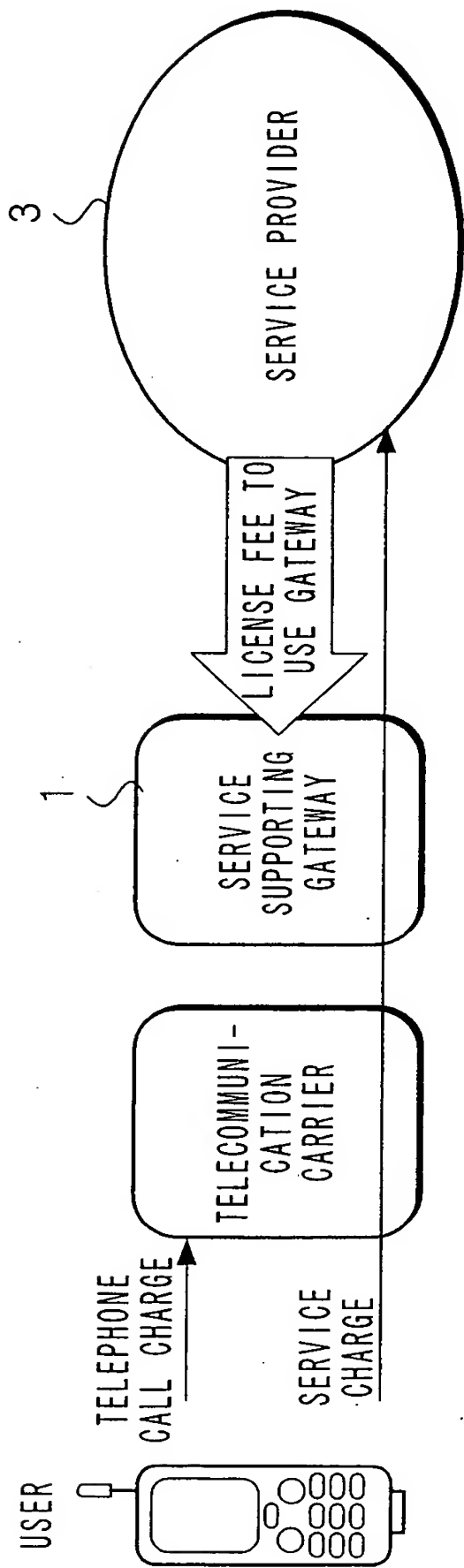




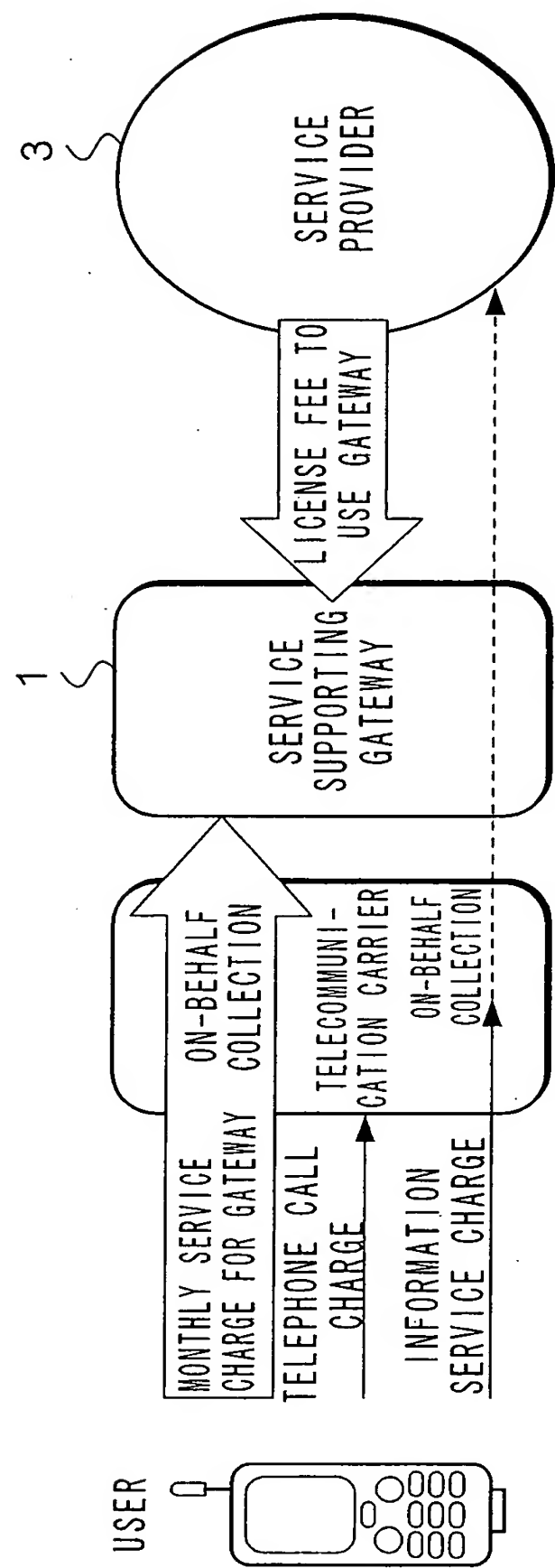
[FIG. 9]



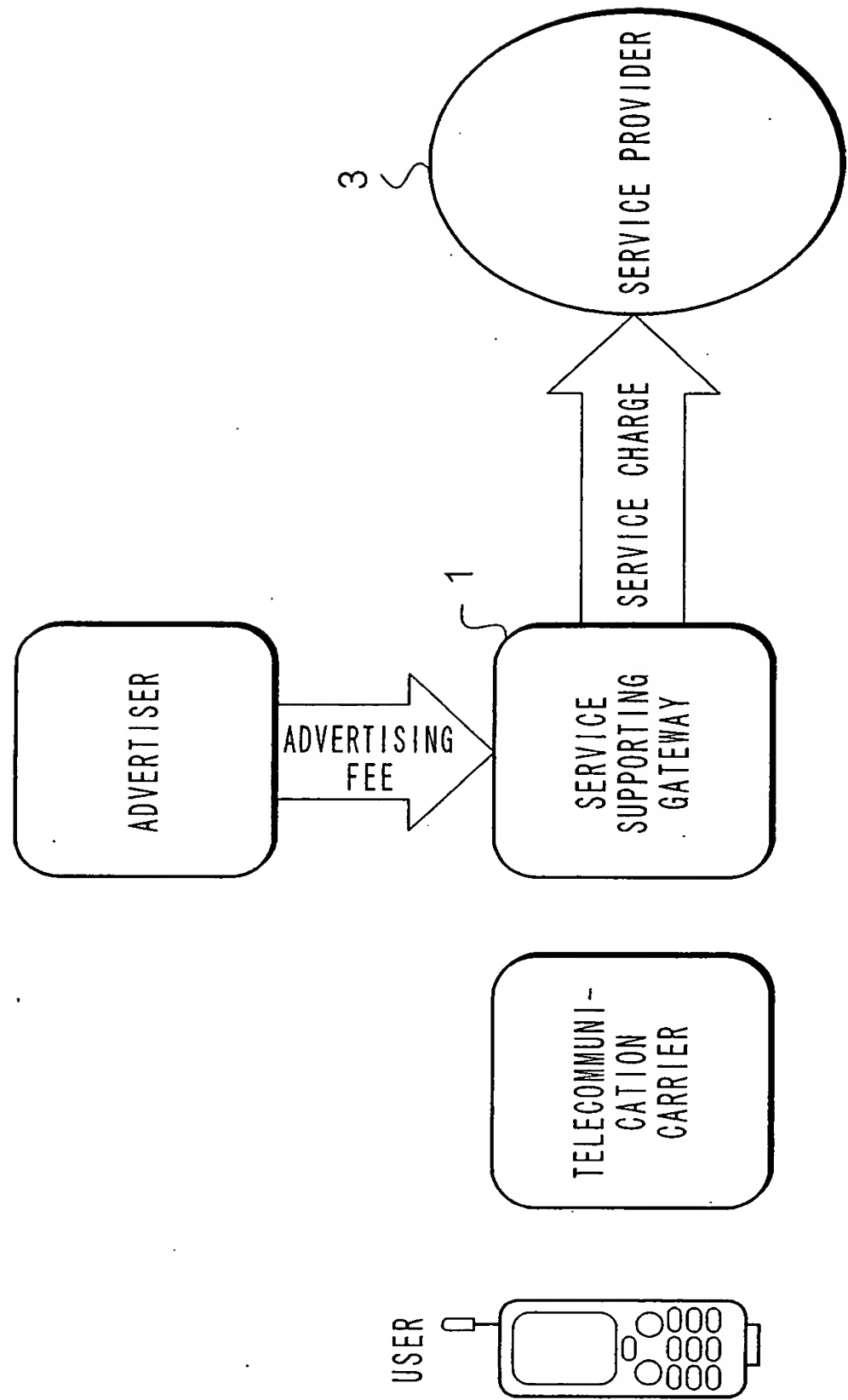
【FIG. 10】



【FIG. 11】



[FIG. 12]



[TITLE OF DOCUMENT] ABSTRACT

[ABSTRACT]

[PROBLEM TO BE SOLVED] To release service providers from a burden of obtaining and managing location information and to accelerate a provision of various location information service.

[MEANS FOR SOLUTION] Service support gateway 1 is connected to network 2. Service provider 3 having ASP 31 and CP 32 provides service relating to the location of locating target person 4 by using network 2. Service supporting gateway 1 provides service provider 3 with service of obtaining location information indicating location of locating target person and with service of sending the location information to specified destination.

[SELECTED FIGURE] FIG. 1